National Aeronautics and Space Administration

Demisable Attachment Fittings for Spacecraft Solar Array Deployables

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In the past, spacecraft deployable requirements were met through designs relying on metallic materials such as Titanium. However, due to the material density these designs posed a risk to personal injury and/or property damage if used on a spacecraft re-entering the Earth's atmosphere. As a result, there is an increase in demand for high strength deployable demisable (i.e. destroyed upon re-entry) technologies for space missions. An attachment fitting system was developed in an effort to satisfy demisable deployable spacecraft requirements for solar array panels. The demisable cup-cone device is capable of maintaining a solar array deployable aligned in stowed position while withstanding the rigors of ground based and flight loads associated with space flight missions. Its geometric design allows it to nest with other cups providing accurate positioning of solar array panels during assembly and stowage. Its mechanical properties allow for release after months of preload and provide sufficient stiffness to meet spacecraft requirements while also making it demisable upon re-entry into Earth's atmosphere. In addition, it provides a 80% or more weight reduction compared to similar non-demisable designs. In summary, these cup-cone attachment fittings provide an excellent solution to demisable, high strength, and lightweight requirements for deployables.

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